

Norman D. Sperber,<sup>1</sup> D.D.S.

## Lingual Markings of Anterior Teeth As Seen in Human Bite Marks

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**REFERENCE:** Sperber, N. D., "Lingual Markings of Anterior Teeth As Seen in Human Bite Marks," *Journal of Forensic Sciences*, JFSCA, Vol. 35, No. 4, July 1990. pp. 838-844.

**ABSTRACT:** A review of the available literature does not reveal a plausible explanation as to why the incisal edges of maxillary anterior teeth do not always mark clearly. Generally, the mandibular incisal edges do mark with some consistency. This paper demonstrates through test bites on skin that the answer lies in the *position* of the mandible.

**KEYWORDS:** odontology, bite marks, dentition, mandibular protrusion, incisal edges markings, incising, lingual markings

As the development of techniques for the study of bite mark evidence has progressed, from the early visual observations of a handful of dentists to current times in which photography (black and white, color, and ultraviolet), salivary swabbing, impressions, transillumination, and image enhancement are standard procedures, our understanding of how the lesions are produced has also improved.

Some prior observations, including that one can examine a bite mark and know the state of an assailant's mind or whether it is of sexual [1,2] or combative nature, have been discounted. Even today, forensic dentists have mistaken curved lesions or lesions that have a punctate appearance for actual bite marks. In a recent California case, it was necessary to perform a histologic examination in order to demonstrate conclusively that the lesion identified by a forensic dentist as a bite mark was, in fact, a postmortem artifact. Since it is not uncommon for medical examiners to contact forensic dentists to verify bite marks or to determine the derivation of other lesions, it is essential that development of an understanding of bite marks continues and that recognition skills be honed.

### History

One of the most common findings in bite mark investigations is that teeth in the lower arch appear to mark skin more clearly than those in the upper. Over the years, various proposals have been set forth to explain this phenomenon. Probably the most common is the suggestion that, since the mandible moves and the maxilla does not during the infliction of a bite, somehow this anatomical-physiological fact explains the clarity of mandibular teeth seen in skin and other objects [3]. This explanation defies common sense because it should be obvious that once the jaws make contact during the commission of a bite, it really does not matter which jaw is in motion.

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<sup>1</sup>Chief forensic dentist for San Diego and Imperial Counties, CA, American Academy of Forensic Sciences, San Diego, CA.

In recent years, the author has received several photographs from other odontologists illustrating lingual markings. These cases, in addition to several of his own, clearly demonstrate the obvious incisal edge markings of the *mandibular teeth* and often a diffuse bruising where the *maxillary teeth* would be expected to mark. In some cases, unmistakable markings of the *lingual surfaces* of the maxillary incisors have been noted. Often these lingual markings will demonstrate the cingulum, interproximal spaces, and gingival contours, including the nasopalatine papilla (Figs. 1–6).

It is the author's opinion that the difference between the upper and lower markings is simply due to the *position* of the mandible when the bite occurs. It is at this point that misunderstandings occur. From the time they enter dental schools, dentists are taught that the incising of the tissue or foodstuff occurs *only* when the mandible is protruded so that the teeth are in an edge-to-edge relationship. In fact, a great deal of emphasis is placed on balancing upper and lower prostheses in both protrusive and centric relationships. Little or no information is ever tendered to students that incising can, and does, occur in the absence of a protrusive relationship. Particularly, denture patients learn

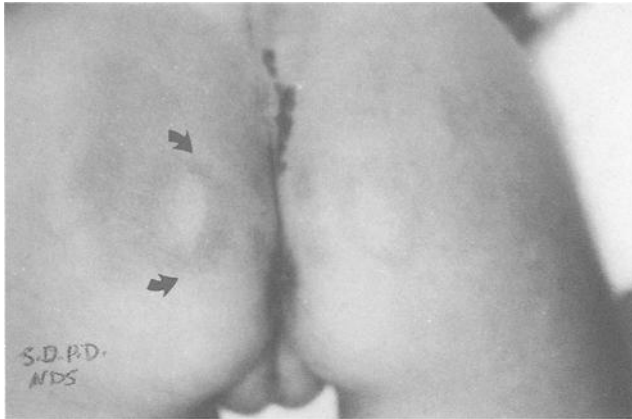


FIG. 1—Child sexual molestation case; note the maxillary lingual markings between the arrows.

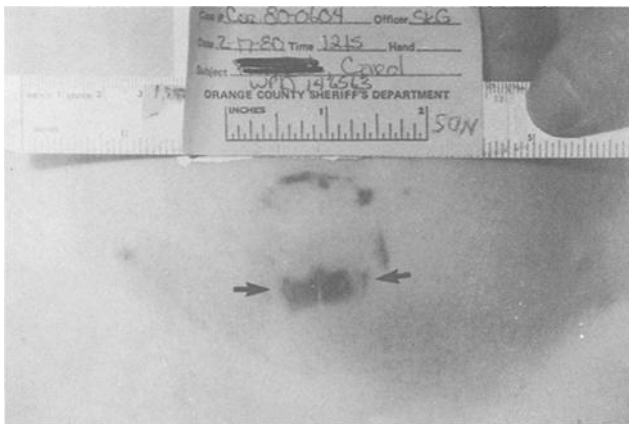


FIG. 2—Homicide showing maxillary lingual markings between the arrows.

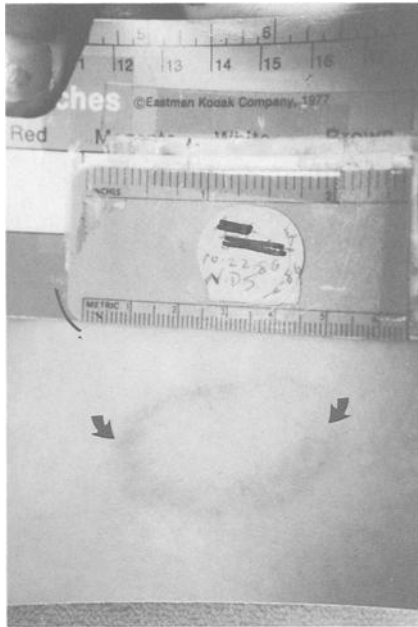


FIG. 3—Felony child abuse, showing maxillary lingual markings between the arrows.

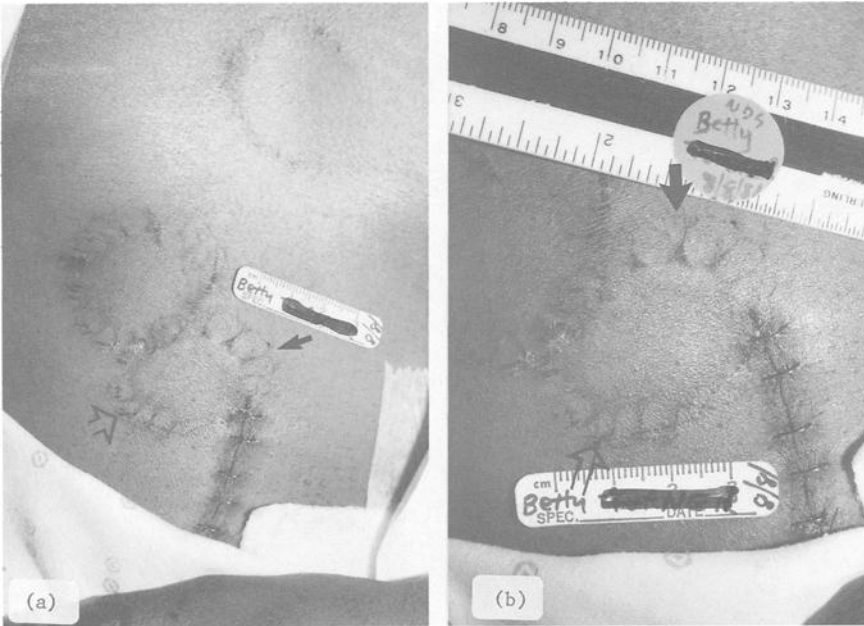


FIG. 4—Attempted homicide, showing abdominal bite marks with exceptionally clear lingual markings of the maxillary (dark arrows) and mandibular teeth (light arrows).

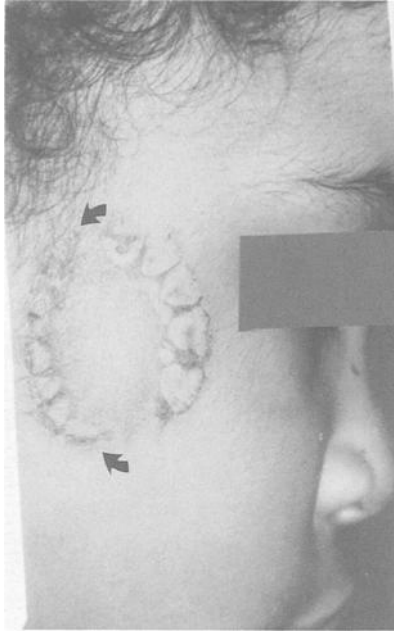


FIG. 5—*Felony child abuse, showing obvious maxillary markings nearest the eye and mandibular markings between the arrows (courtesy of Dr. Haskell Askin).*

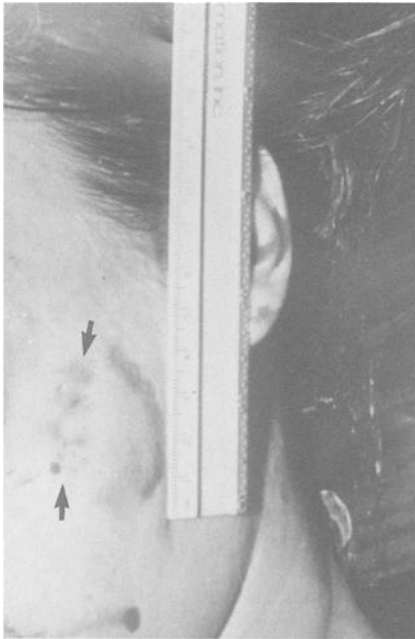


FIG. 6—*Homicide, showing mandibular incisal markings near the ruler and maxillary lingual markings between arrows.*

rather quickly that dentures become dislodged during protrusive excursions, but not in centric closure. Soft foods such as sandwiches (hot dogs, hamburgers) are often incised with the mandible in centric relationship so that the mandibular incisal edges sever food supported against the *lingual* surfaces of the maxillary teeth. When such foodstuffs as corn-on-the-cob or spareribs are eaten, it is necessary for the mandible to protrude in order for the incisal edges to approximate each other as they incise.

It should be obvious at this point that the very same movements will occur in bites on skin. Thus, when a forensic dentist views a bite mark with a typical donut shape illustrating distinct teeth marks where the upper and lower teeth would meet, the examiner can be fairly certain that the bite occurred in protrusive position. On the other hand, if a diffuse or blurry appearance is observed where one would expect to see the edges of the maxillary teeth, or if clear indications of maxillary lingual anatomy are seen, the examiner can safely conclude that the bite was the result of the teeth marking while in centric relationship. In some rare cases, the lingual surfaces of both the lower and upper incisors may be seen. It is the author's observation that this event is the result of the mandibular teeth striking as described above and *then* moving *beyond* the protrusive position so that the same mechanism as described above causes markings of the mandibular lingual surfaces. Stated in other words, in some cases the bite may occur as a back-and-forth motion of the mandible.

### Method

Ten volunteers were recruited. They were told to bite the skin of the dorsal surface of their hand in both protrusive and centric positions. They were requested to bite twice on one hand in the centric position and twice on the other hand in the protrusive position. The site was ideal because of skin mobility and access to the mouth of each volunteer. The results were uniform. Protrusive biting produced clear imprints of the incisal edges of the teeth in both arches, whereas centric closure produced representations of the



FIG. 7a—Centric position test bite in a live subject.

maxillary lingual surfaces. Where the subjects were asked to overprotrude, markings by the mandibular lingual surfaces also occurred. It appears, however, that in actual cases, mandibular lingual marking is less frequent in occurrence.

Figures 7a, 7b, 8a, and 8b demonstrate the various closures and experimental markings in the skin detailed in the preceding text.

### Conclusions

It has been demonstrated that lingual markings of maxillary and mandibular teeth are caused by the *relationship* between the upper and lower arches during biting. These

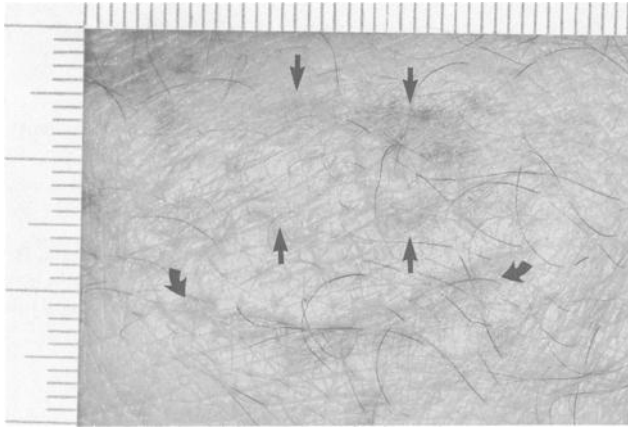


FIG. 7b—Resultant lesion from the test bite in Fig. 7a: note the definite mandibular incisal markings (curved arrows) with obvious maxillary lingual markings between the straight arrows.



FIG. 8a—Protrusive position test bite in a live subject.

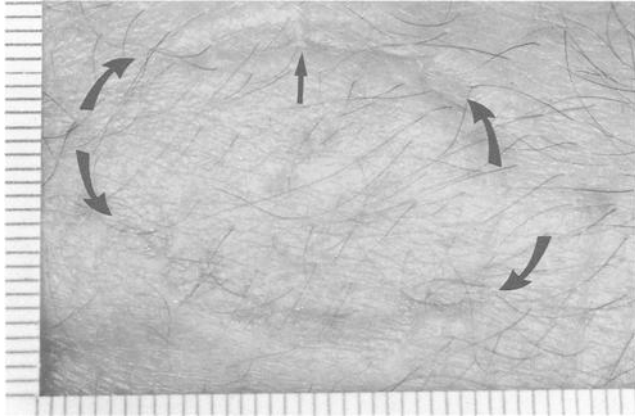


FIG. 8b—Resultant lesion from the test bite in Fig. 8a: note the obvious maxillary and mandibular incisal markings between arrows, including diastema (small arrow).

markings should not be classified as “drag marks,” “linear striations,” or other similar lesions. Once the phenomenon of lingual marking is recognized and understood, it is less likely that examiners will view these lesions as the products of a struggle or, as in some reports, the state of the biter’s mind.

#### *Acknowledgments*

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#### **References**

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Address requests for reprints or additional information to  
Norman D. Sperber, D.D.S.  
3737 Moraga Avenue, Suite A-302  
San Diego, CA 92117-5457