

## Supplementary Information

### Result of ToF-SIMS analyses for the disto-buccal area of the tooth

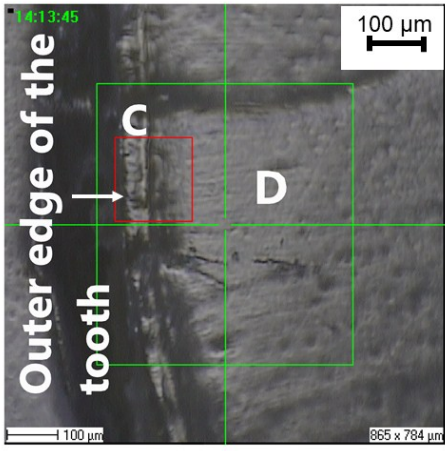
In addition to the results presented in the main text which are related to the mesio-buccal area of the tooth as our primary area of interest, here we present supplementary results obtained from the disto-buccal area of the tooth by ToF-SIMS, following exactly the same methodological protocol.

The results presented in SI Fig.1 shows that Ca<sup>+</sup> intensity oscillate across the total width of the AEFC in a similar pattern found in the mesio-buccal area. A sharper rise in Ca<sup>+</sup> intensity values (above 320) can be seen closer to the outer edge of the tooth in both mesio- and disto-buccal areas of the AEFC, correlating to the older age of the patient. Lower Ca<sup>+</sup> intensity values are detected closer to the cemento-dentinal junction in both mesio- and disto-buccal areas of the AEFC, which correlates to the younger age of the patient. The linescan in the Fig.1b, obtained from the disto-buccal area of the tooth clearly shows the range of the oscillations in Ca<sup>+</sup> intensity from the cemento-dentinal junction towards the outer edge of the tooth (distance between 60 – 7 μm on the linescan across Ca<sup>+</sup> ion image). On the other hand, this disto-buccal area of the AEFC has been disturbed during the process of the tissue formation. The total width of the AEFC here is only 53 μm as opposed to the mesio-buccal area with 73 μm. According to the microscopical inspection we conducted, this tissue damage most likely occurred due to an external impact to this area sometime during the process of its formation. Unfortunately, this type of damage is a common occurrence, as AEFC is highly susceptible to both external and internal influences. The tissue would normally regain its usual tempo of formation after the disturbance event, as long as its nutritional supply is provided by periodontal fibres, as happened here. The acquisition of good sample targets requires considerable knowledge of the different cementum micro-structures and advanced sample sectioning and mounting skills.

In summary, the readings gained from this disto-buccal area provide support for the results obtained from the mesio-buccal in main text, because they are showing a similar pattern of the oscillation in  $\text{Ca}^+$  intensity values, even though this part of the AEFC is damaged. The supporting results of our second analysis here indicate that more cross-checks on the same tooth must be executed by life history researchers, to support substantial claims.

**SI Fig. 1. Distribution of the molecular ions identified by SIMS in disto-buccal area of the tooth.** (a) A ToF-SIMS micrograph of the area of interest. “D” represents dentine; “C” represents acellular extrinsic fiber cementum; red square is demarking the area which has been analysed by ToF-SIMS. (b) Molecular ion mapping and linescan ion images of calcium ( $\text{Ca}^+$ ), and hydroxyapatite ( $\text{HAp}^+$ ). Left side of the plots represents outer edge of the tooth. The ion images are normalized to the total ion current.

**a**



**b**

