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Characterization of salivary calculi

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Calculi in salivary glands and ducts (sialoliths) can be found in about 1% of the general population [1, 2]. Typically sialolithiasis causes long-term obstruction of salivary secretions, leading to atrophy of the gland with concomitant ceasing of the secretory function and ultimately fibrosis [3]. Although some theories have been put forward regarding the etiology and pathogenesis of salivary calculi, the exact nucleation and growth mechanisms remain elusive. An exhaustive characterization of salivary calculi and systematic evaluation of the existing etiologic theories is therefore required [4, 5].

Structural and chemical characterization of siaoliths has been carried out by scanning electron microscopy (SEM) and transmission electron microscopy (TEM), both combined with energy dispersive spectroscopy. Local hardness has been assessed by microindentation. Sialoliths tend to exhibit one highly mineralized core with subsequent layers of variable mineralization, which alternate thereafter in succession following a chronologic sequence (Figure 1). The layers present either a laminar morphology or organic globules partially mineralized (Figure 2 (a) and (b)). The organic matter is rich in sulfur [4, 5] and presents lower hardness, while the harder mineral matter consists essentially of hydroxyapatite (Figure 3).

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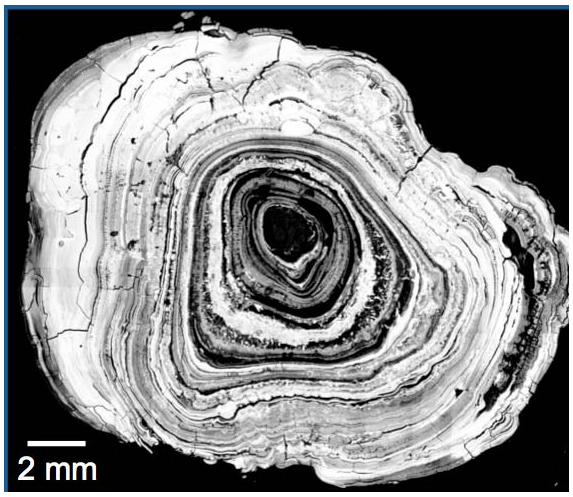

Figure 1. SEM image of salivary calculus showing chronological layers presenting a laminar or globular morphology (absent core).

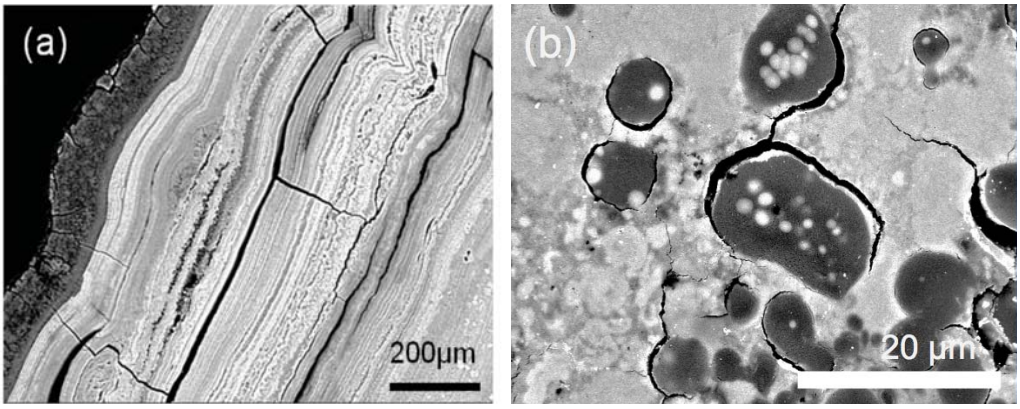

Figure 2. (a) Detail of a laminar layer. (b) Detail of a globular region.

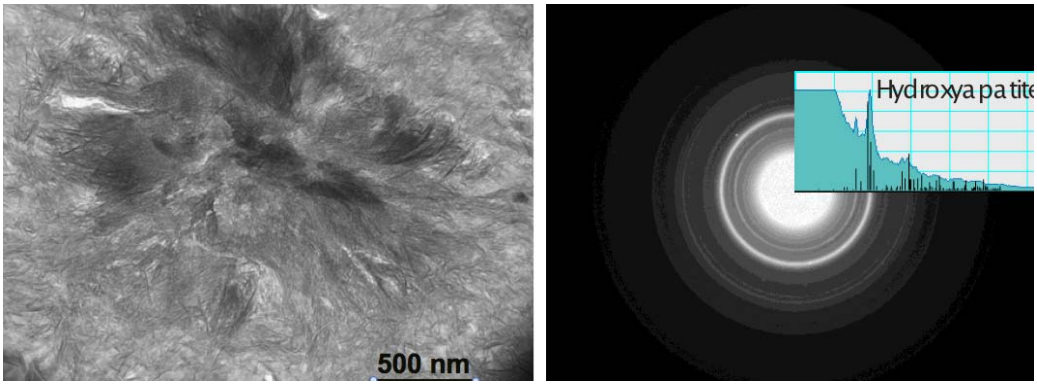

Figure 3. Bright-field TEM image showing filamentary crystals identified as hydroxyapatite in electron diffraction experiments.

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