POLARIZED RED LASER 650 NM MICROSCOPY OF DENTIN FROM NATURAL AND FOSSIL CROCODILE TEETH

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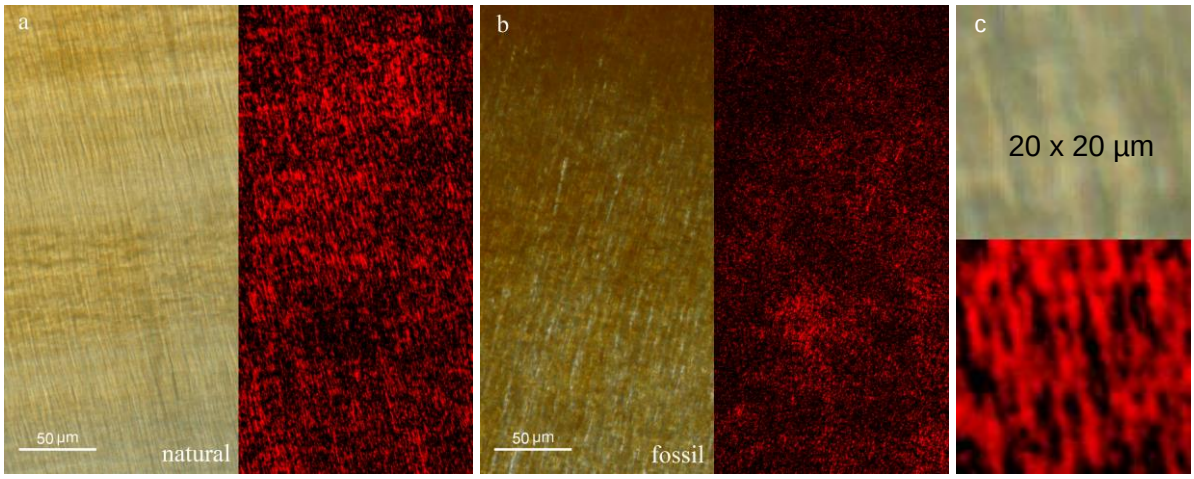
The potential for applying polarized red laser 650 nm microscopy (named red microscopy [1]) to image birefringent materials has been probed by studying dentin from both *Crocodilus niloticus* teeth and *Elosuchus* fossil teeth. These teeth provide a different polarization scenario since in natural dentin predominant birefringence is due to the collagen fibres, whereas in fossil dentin birefringence depends on minerals, as collagen fibres have been decayed overtime. Teeth were embedded in poly methyl methacrylate and radial ground-sections (50-150 µm thick) were obtained. Different sections were prepared in the study: non-decalcified, decalcified, and collagen-free sections in the case of *Crocodilus niloticus*, and mineralized sections in the case of *Elosuchus*. All of these were examined on a polarizing finite microscope (Optiphot 2, Nikon, Japan) equipped with an interchangeable afocal illumination consisting of white light and 1mW red laser 650 nm (Laserfuchs, Germany). The same fields of view were captured correlatively first with white light and then with red laser using a digital CCD camera (DXM 1200F, Nikon), (figure a, b). The polarization laser image was monochromatic, in red and black, with high contrast and S/N ratio, and with respect to the ordinary polarization image had higher spatial resolution (fig. c). The formation of polarization laser image depends on wavelength (λ = 650 nm), optical intensity, optical path difference ($\Gamma = Bt$) and optical performance of the objective. As the birefringence strength (B) of the dentin components (collagen, minerals) is different, these components have to be detected separately, and section thickness (t) has to be adjusted accordingly.



[1] Gomez, S. Red Microscopy: Polarization Imaging with 1mW Laser 650 nm. Focus on Microscopy 2020.