

Widespread occurrence of unicellular eukaryotes forming amorphous carbonate inclusions

A. MARTIGNIER^{1*}, J.-M. JAQUET¹,
M. FILELLA², D. ARIZTEGUI¹

¹University of Geneva, Department of Earth sciences, 1205 Geneva, Switzerland (daniel.ariztegui@unige.ch, jean-michel.jaquet@unige.ch, *correspondance: agathe.martignier@unige.ch)

²University of Geneva, Department F.-A. Forel, 1205 Geneva, Switzerland (montserrat.filella@unige.ch)

Unicellular phytoplankton species have been signaled to form intracellular inclusions of amorphous calcium carbonates [1], a novelty for eukaryotic unicellular organisms. These granules, named micropearls, show nanoscale oscillatory zoning and are rich mostly in Ca, Sr and Ba (Figure 1). First described in Lake Geneva (Switzerland), they have also been observed in other freshwater lakes such as Bourget (France) and Kournas (Crete), as well as in the slightly brackish Lake Titicaca (Bolivia/Peru), confirming a widespread occurrence. Micropearls represent a previously unknown type of non-skeletal biomineralization and reveal an unexpected pathway in the geochemical cycle of alkaline-earth metals. Moreover, Ba and Sr concentrations measured in the micropearls are extremely high compared with the undersaturated water of the lake. This can only be explained by a high biological pre-concentration of these elements, which might be of interest to develop alternative bio-remediation methods.

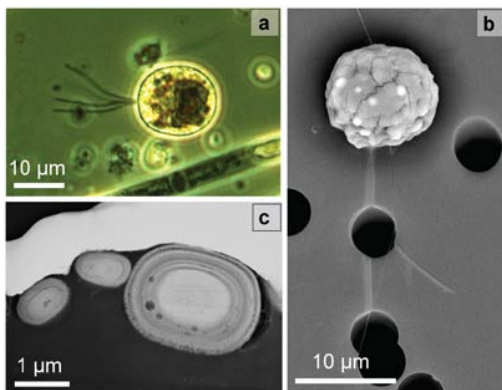


Figure 1: a) Live unicellular organism *Tetraselmis* cf. *cordiformis* (TC). b) TC fixed with glutaraldehyde (SEM backscattered image). Sr-rich micropearls show in white. c) cross-section through Ba-rich micropearls (TEM image).

[1] Martignier *et al.* (2017) *Geobiology* **15**, 240-253.