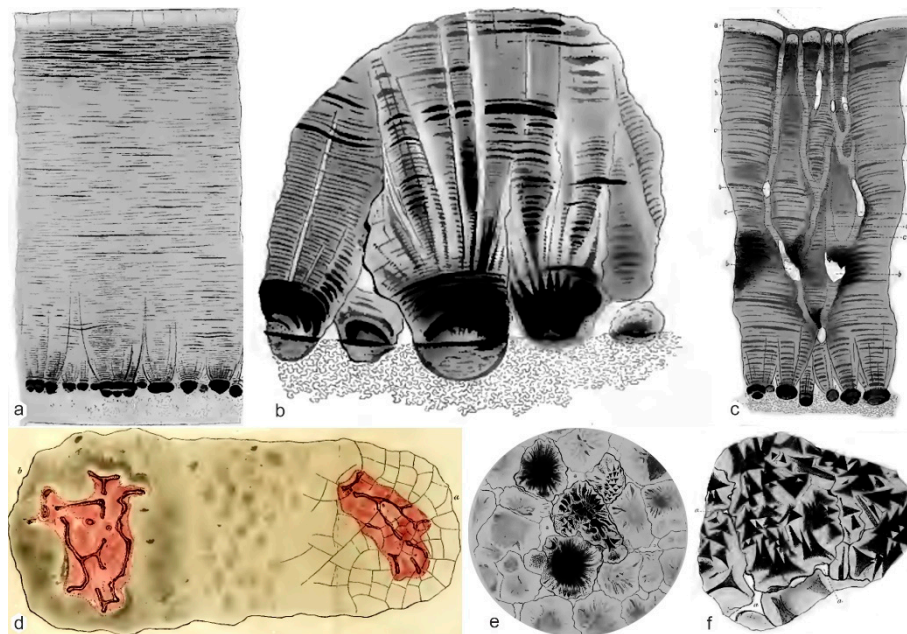
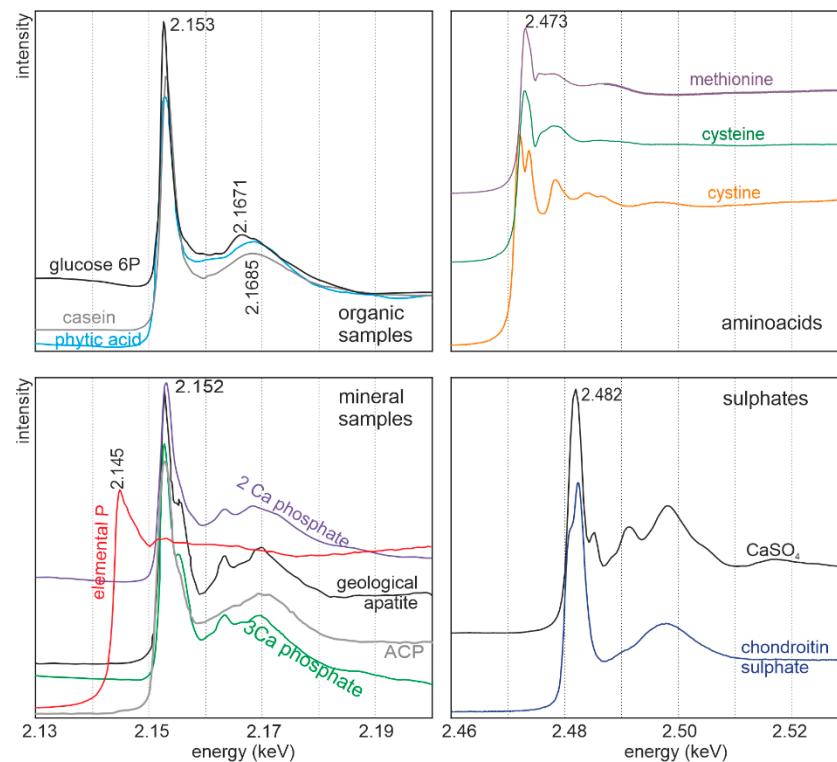


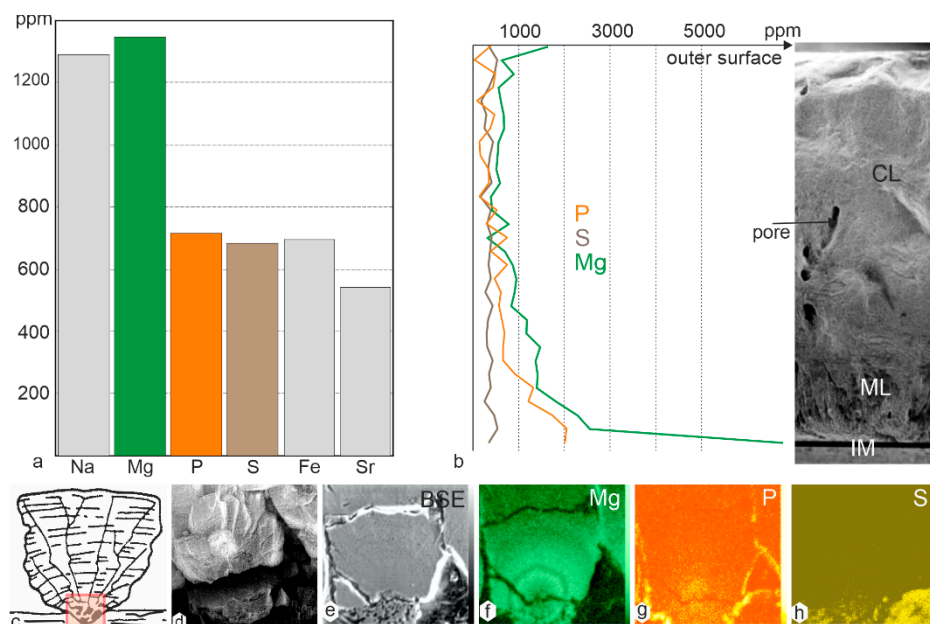
## Supplementary Material



**Figure S1.** Drawings of the structure of *Struthio* eggshells in Nathusius [24]. (a) Vertical section showing the main layers, spherulites, growth pattern and the outer prismatic layer. (b) Detail of the mammillary layer, spherulites, growth layers and the inner organic membrane. (c) Vertical section showing the complex structure of a pore. (d) Outer surface showing the complex opening structure of two pores. (e) Transversal section showing the radial divergent inner structure of spherulites. (f) Transverse section in the inner layer showing the geometrical shape of the calcitic crystals of the mammillary layer.

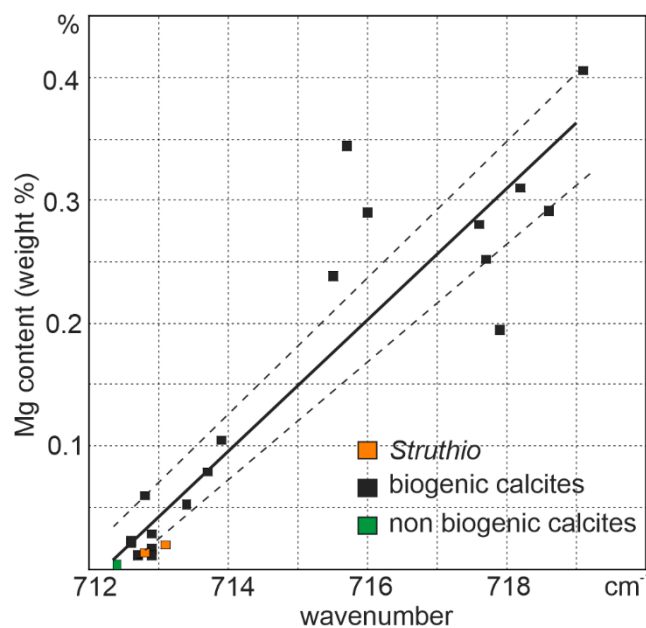


**Figure S2.** Organic and minerals standards for S and P K edge XANES analyses. For both S and P standards, the profiles of organic molecules are “smoother” than those of mineral samples.



**Figure S3.** Composition of Struthio eggshell. (a) Average contents in minor chemical elements. (b) Elemental composition across the thickness of the eggshell, showing the high Mg and P

content in the spherulitic layer. (c-h) Chemical distribution maps of the spherulitic layer showing some faint growth lines.



**Figure S4.** Correlation between the FTIR v4 band and the Mg content, showing that eggshell is low Mg calcite.